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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,285	09/16/2005	Kazuyoshi Yamazaki	278536US26PCT	2471
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
CHEN, KEATH T				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
09/30/2009		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/549,285

**Applicant(s)**

YAMAZAKI ET AL.

**Examiner**

KEATH T. CHEN

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 33-35, 38, 39, 41 and 45-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 33-35, 38, 39, 41 and 45-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicants' submission, filed on 08/20/2009, in response to the rejection of claims 33-35, 38, 39, 41, and 45-53 in the non-final office action mailed on 02/23/2009, by presenting argument only without claim amendment is acknowledged and will be addressed below.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**2. Claims 33-35, 38-39, 41, and 45-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano et al. (US 6407405, hereafter '405), in view of Boydston et al. (US 6375749, hereafter '749), Anders (US 20020000779, hereafter '779), and Roth et al. (DE 4007523, hereafter '523).**

3. '405 teaches some limitations of:

4. Claim 33: A substrate processing apparatus (Fig. 1) comprising: a processing vessel (chamber #1, col. 3, line 3) forming a processing space; a supporting table (substrate holder, #3, col. 3, line 27) for supporting a substrate (S) to be processed in the processing space, the substrate having a surface to be processed (the surface facing the radical generation units); a first radical generation unit (#41, col. 3, lines 53-55), provided at a first sidewall portion of the processing vessel, for forming first radicals by a high frequency plasma (RF, col. 3, line 55) and supplying the first radicals into the processing space; a second radical generation unit (#31, col. 3, lines 48-51) for forming

second radicals by a high frequency plasma (RF, col. 3, line 51) and supplying the second radicals into the processing space; a gas exhaust port (label "P", vacuum pump #2, col. 3, line 4), provided at a second sidewall portion of the processing vessel, to exhaust the processing space, the second sidewall portion being disposed opposite to the first sidewall portion with the supporting table placed therebetween (S is between #41 and pump "P").

5. '405 does not teach the other limitations of:

6. Claim 33: a rotatable supporting table, (a second radical generation unit) provided at the first sidewall portion of the processing vessel, wherein the first and the second radical generation unit and the gas exhaust port are provided at the processing vessel, such that the first and the second radicals are respectively introduced from the first sidewall portion toward the second sidewall portion along a first and a second flow path which are substantially parallel to the surface of the substrate mounted on the supporting table, a flow adjusting plate interfering with the first flow path to change a flow direction thereof, the first radicals flowing into the processing space along the first flow path whose flow direction has been changed.

7. '749 is an analogous art in the field of semiconductor fabrication (field of the invention; '405 field of the invention), particularly in growing of an epitaxial layer (col. 2, lines 61-63, '405, col. 5, line 48). '749 teaches a rotation and translation mechanism (not shown, col. 5, lines 13-17) to substrate support shaft (Fig. 3 #82) and the inlet

(#106, col. 6, lines 65-67) to be parallel to the surface of the substrate (Fig. 3)

8. '779 is an analogous art in the field of semiconductor processing ([0004] '405 field of the invention), particularly in array of plasma (field of the invention). '779 provides a parallel array of plasma (Fig. 9, [0093]).

9. '523 is an analogous art in the field of plasma processing (title), particularly in plurality of plasma source to form mixture for surface treatment (Abstract). '523 teaches a pivotable diaphragm (#6, col. 2, lines 29-33; English translation, page 2, paragraph 6, lines 4-5) to divert one of the plasma source (#2, lines 3-6 of page 2).

10. At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have consolidated various plasma sources in Fig. 1 of '405 into a rectangular parallel array of plasma, as taught by '779, such that all plasma sources are at the same/first plane; to have arranged the parallel array of plasma in parallel to the substrate surface and to have added rotation mechanism, as taught by '749, to drive the substrate holder (#3); and to have added a pivotable diaphragm/flow adjusting plate interfering with the first flow path to change a flow direction of the first radical, as taught by '523 (Fig. 1), to the apparatus in Fig. 1 of '405.

11. The motivation to add a rotating diaphragm/flow adjusting plate is to prevent premature evaporation, as taught by '523 (English translation, page 2, paragraph 6, lines 4-5). The motivation to add rotation mechanism for the supporting table is for evenly distributing reactants ('749, col. 5, lines 17-19) and the motivation to consolidate plasma sources is for a compact small diameter source design ('779, [0046]). The motivation to place the inlet in parallel with the substrate surface is suitability. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

12. '405, '749, and '523, together, disclose the claimed invention except for (the oxygen radical generation unit) at the first plane of the sidewall at the first side. It would have been an obvious matter of design choice to re-arrange the generation units at the same plane of the sidewall, since it has been held that rearranging parts of an invention

only involves routine skill in the art. *In re* Japikse, 86 USPQ 70.

13. '405 and '523 each further teaches the limitations of:

14. Claim 41 (Besides the limitations of claim 33): a flow adjusting plate ('405, shutter S4, col. 3, lines 24-25, is capable of interfering flow; or '523 rotating diaphragm #6) interfering with the first flow path to supply the first radicals towards a center of the substrate mounted on the supporting table (when shutter is open).

15. '405 further teaches the limitations of:

16. Claims 34 and 48: The substrate processing apparatus of claim 33 (or 41), wherein the first radical generation unit is a nitrogen radical generation unit (#41, col. 3, lines 53-55) and the second radical generation unit is an oxygen radical generation unit (#31, col. 3, lines 48-51).

17. Claims 46 and 52: The substrate processing apparatus of claim 33 (or 41), wherein the first radical generation unit is an oxygen radical generation unit (#31, col. 3, lines 48-51) and the second radical generation unit is a nitrogen radical generation unit (#41, col. 3, lines 53-55).

18. Claims 39 and 50: The substrate processing apparatus of claim 33 (or 41), wherein a center of the first flow path intersects with that of the second flow path substantially at a center of the substrate mounted on the supporting table (by opening shutter S3 and S4, as shown in Fig. 1).

19. '779, in the above combination, teaches the limitations of:
20. Claims 35 and 49: The substrate processing apparatus of claim 34 (or 48), wherein the nitrogen radical generation unit (one of the four in Fig. 9) includes a first gas passageway (one of the cell #160) and a first high frequency plasma generation unit ('405, RF, col. 3, line 55) formed at a part of the first gas passageway to excite a nitrogen gas passing therethrough into a plasma; and the oxygen radical generation unit (another one of the four in Fig. 9) includes a second gas passageway (another one of the cell #160) and a second high frequency plasma generation unit (RF, col. 3, line 51) formed at a part of the second gas passageway to excite an oxygen gas passing therethrough into a plasma, wherein the first and the second gas passageway are in communication with the processing space.
21. Claims 47 and 53: The substrate processing apparatus of claim 46 (or 52), wherein the oxygen radical generation unit (one of the four in Fig. 9) includes a first gas passageway (one of the cell #160) and a first high frequency plasma generation unit ('405, RF, col. 3, line 55) formed at a part of the first gas passageway to excite a oxygen gas passing therethrough into a plasma; and the nitrogen radical generation unit (another one of the four in Fig. 9) includes a second gas passageway (another one of the cell #160) and a second high frequency plasma generation unit (RF, col. 3, line 51) formed at a part of the second gas passageway to excite an nitrogen gas passing therethrough into a plasma, wherein the first and the second gas passageway are in communication with the processing space.



22. The above combination of '405, '749, '779, and '523 also would have met the limitations of:

23. Claims 45 and 51: The substrate processing apparatus of claim 33 (or 41), wherein the first radicals and the second radicals ('779, from the parallel plasma array) are introduced into the processing vessel substantially parallel to the surface of the substrate ('749, from the inlet direction).

24. Furthermore, for

25. Claim 38: The substrate processing apparatus of claim 33, wherein the distance between a center of the second flow path and that of the substrate mounted on the supporting table is 40 mm or less.

26. Applicant's claim requirements amount to an intended use of the pending apparatus claims. The claimed "distance" is a function of the substrate's geometry and thickness and/or size of the substrate. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106).

Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

***Response to Arguments***

Applicant's arguments filed 08/20/2009 have been fully considered but they are not persuasive.

27. In regarding to 35 USC 103 rejection of claims 33-35, 38-39, 41, and 45-53 based on '405, '749, '779, and '523, Applicants argue that in '523 the vapor is electronically neutral and the evaporator 2 does not produce an ion or radical, not a plasma source, thus '523 does not constitute a flow adjusting plate interfering with the first flow path to change a flow direction, the first radicals flowing into the processing space along the first flow path whose flow direction has been changed, see the pages 8 to 10, particularly the first paragraph of page 9.

This argument is found not persuasive.

'523 repeatedly stated the evaporator for boron is producing plasma and ions, for example: "both evaporator crucibles ... plasma-supporter layer separation realize to accelerate both ions and ions of the evaporating components", page 2, lines 4-7; "the invention achieved is ... one plasma producer ... on the base of ... borons, ...", the last completer paragraph of page 1; and "an electron beam evaporator for borons ... in the homogeneous range of a plasma with a ion dense ...", see the lines 2-3 of the last incomplete paragraph of page 1.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./  
Examiner, Art Unit 1792

/Ram N Kackar/

Primary Examiner, Art Unit 1792